



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/073,309	02/13/2002	Yasuyuki Hirai	511.41182X00	4478

20457 7390 05/07/2003

ANTONELLI TERRY STOUT AND KRAUS
SUITE 1800
1300 NORTH SEVENTEENTH STREET
ARLINGTON, VA 22209

C/

EXAMINER

FEELY, MICHAEL J

ART UNIT

PAPER NUMBER

1712

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/073,309

Applicant(s)

HIRAI ET AL.

Examiner

Michael J Feely

Art Unit

1712

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 13-15 is/are rejected.
- 7) ☒ Claim(s) 4-12 and 16-18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Art Unit: 1712

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Objections

2. Claims 4-12 and 16-18 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims 4-12 and 16-18 have not been further treated on the merits.

Claim Rejections - 35 USC § 102/103

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language;

or

(c) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the

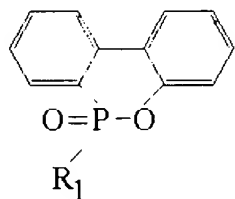
Art Unit: 1712

reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1-2, 13, and 15 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Sagara et al. (US Pat. No. 6,524,709) and Wang et al. (US Pat. No. 6,291,626).

Normally, only one reference is used to make a rejection under 35 U.S.C. 102; however, a 35 U.S.C. 102 rejection over multiple references has been held to be proper when extra references are cited to: (A) prove the primary reference contains an "enabled disclosure;" (B) explain the meaning of a term used in the primary reference; or (C) show that a characteristic not disclosed in the reference is inherent – *see MPEP 2131.01*. In the following rejections, Wang et al. is used to show that the organophosphorous compound used in Sagara et al. inherently satisfies Formula 1 of the instant invention.

Regarding claims 1-2, Sagara et al. disclose *(I)* a resin composition comprising: an epoxy resin (column 2, lines 53-67; column 5, lines 33-48), an amine-type curing agent (column 6, lines 35-40), an organophosphorous compound having a structure represented by formula 1:



Formula 1

wherein R₁ is an aryl radical with two hydroxyl groups, and the aryl radical can be substituted by one to three lower alkyls (column 2, lines 54-61; column 65 through column 4, line 11); and an organic solvent (column 6, lines 41-50), wherein the epoxy resin and the organophosphorous compound have been *compounded* at a temperature of 50°C or lower (column 5, line 67 through

Art Unit: 1712

column 6, line 1); and (2) wherein the epoxy resin contains at least one epoxy resin selected from a phenol-novolak epoxy resin, a cresol-novolak epoxy resin, and a dicyclopentadiene-modified novolak epoxy resin in an amount of 30 wt% or more versus the combined amount of the whole epoxy resin (column 2, lines 53-67).

Sagara et al. do not provide a structural diagram for their organophosphorous compound; rather, it is described in terms of its starting materials: 1) an organic phosphorous compound selected from 3,4,5,6-dibenzo-1,2-oxaphosphane-2-oxide and diphenylphosphineoxide (column 4, lines 4-11); and 2) a quinone compound selected from 1,4-benzoquinone, 1,2-benzoquinone or 1,4-naphthoquinone (column 3, line 66 through column 4, line 3). Wang et al. (US Pat. No. 6,291,626) show the reaction of: 1) DOPO (9,10-dihydro-9-oxa-10-phosphaphenanthrene-10-oxide), which is an alternate way of expressing the compound 3,4,5,6-dibenzo-1,2-oxaphosphane-2-oxide; and 2) 1,4-benzoquinone or 1,4-naphthoquinone (top of columns 7 and 8). The resulting product satisfies the structure set forth in the instant invention; hence, the reaction product of Sagara et al. would have inherently satisfied the structure set forth in the instant invention.

It should be noted the term *compounded* has been interpreted in a broad sense to mean, "to put together (parts) so as to form a whole" – *Merriam-Webster's Collegiate Dictionary, Tenth Edition*. Therefore, the disclosed step of "adding" the epoxy resin to the organophosphorous compound (column 5, line 67 through column 6, line 1) reads on the step of *compounding*. Sagara et al. do not disclose a temperature range for this addition step; however, when a temperature range is not disclosed for a process step, it can be assumed that it takes place

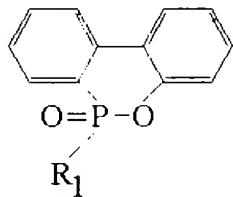
Art Unit: 1712

at room temperature, which would inherently fall within the claimed range. Therefore, the prior art would have inherently satisfied the conditions of the compounding step.

Furthermore, it should be noted that claims 1 and 2 are product by process claims. It has been found that, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process" —*In re Thorpe*, 777 F. 2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Where the starting materials used in Sagara et al. are identical to the starting material is the instant invention, the final product of Sagara et al. would have inherently been the same as the final product of the instant invention, regardless of the process steps involved.

Therefore, if not explicitly taught by the reference, then the teachings would have been obvious to one of ordinary skill in the art at the time of the invention.

Regarding claims 13 and 15, Sagara et al. disclose (13) a method for producing a resin composition comprising: an epoxy resin (column 2, lines 53-67; column 5, lines 33-48), an amine-type curing agent (column 6, lines 35-40), an organophosphorous compound having a structure represented by formula 1:



Formula 1

Art Unit: 1712

wherein R₁ is an aryl radical with two hydroxyl groups, and the aryl radical can be substituted by one to three lower alkyls (column 2, lines 54-61; column 65 through column 4, line 11); and an organic solvent (column 6, lines 41-50), wherein the epoxy resin and the organophosphorous compound have been *compounded* at a temperature of 50°C or lower (column 5, line 67 through column 6, line 1); and (15) wherein the resin composition further comprises an inorganic filler (column 6, lines 54 through column 7, line 6).

Sagara et al. do not provide a structural diagram for their organophosphorous compound; rather, it is described in terms of its starting materials: 1) an organic phosphorous compound selected from 3,4,5,6-dibenzo-1,2-oxaphosphane-2-oxide and diphenylphosphineoxide (column 4, lines 4-11); and 2) a quinone compound selected from 1,4-benzoquinone, 1,2-benzoquinone or 1,4-naphthoquinone (column 3, line 66 through column 4, line 3). Wang et al. (US Pat. No. 6,291,626) show the reaction of: 1) DOPO (9,10-dihydro-9-oxa-10-phosphaphenanthrene-10-oxide), which is an alternate way of expressing the compound 3,4,5,6-dibenzo-1,2-oxaphosphane-2-oxide; and 2) 1,4-benzoquinone or 1,4-naphthoquinone (top of columns 7 and 8). The resulting product satisfies the structure set forth in the instant invention; hence, the reaction product of Sagara et al. would have inherently satisfied the structure set forth in the instant invention.

As in claims 1 and 2, the term *compounded* has been interpreted in a broad sense to mean, "to put together (parts) so as to form a whole" – *Merriam-Webster's Collegiate Dictionary, Tenth Edition*. Therefore, the disclosed step of "adding" the epoxy resin to the organophosphorous compound (column 5, line 67 through column 6, line 1) reads on the step of *compounding*. In addition, as in claims 1 and 2, the compounding temperature has been assumed

Art Unit: 1712

to be room temperature, which would inherently fall within the claimed range. Therefore, the prior art would have inherently satisfied the conditions of the compounding step.

Therefore, if not explicitly taught by the reference, then the teachings would have been obvious to one of ordinary skill in the art at the time of the invention.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

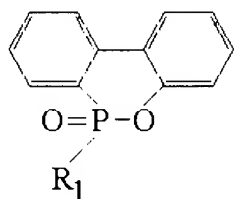
6. Claims 3 and 14-15 rejected under 35 U.S.C. 103(a) as being unpatentable over Sagara et al. (US Pat. No. 6,524,709).

Regarding claim 3, Sagara et al. are as set forth above in claim 1-2 and incorporated herein. Sagara et al. are silent regarding the composition according to claims 1 or 2, wherein the amount of amine-type curing agent compounded is from 0.3 to 0.6 equivalent per epoxy group of the epoxy resin. Applicant fails to show criticality for this range, and it is known in the art that the quantity of curing agent in an epoxy resin system is a result-effective variable. If the quantity is too low, sufficient curing will not take place, and an excess of curing agent is not cost-effective. Furthermore, it has been found that, "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation," – *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA); and *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Art Unit: 1712

Therefore, if not explicitly taught by the reference, then the teachings would have been obvious to one of ordinary skill in the art at the time of the invention.

Regarding claims 14 and 15, Sagara et al. disclose **(14)** a method for producing a resin composition comprising: an epoxy resin (column 2, lines 53-67; column 5, lines 33-48), an amine-type curing agent (column 6, lines 35-40), an organophosphorous compound having a structure represented by formula 1:



Formula 1

wherein R_1 is an aryl radical with two hydroxyl groups, and the aryl radical can be substituted by one to three lower alkyls (column 2, lines 54-61; column 65 through column 4, line 11); and an organic solvent (column 6, lines 41-50); allowing the epoxy resin and the amine-type curing agent to react at a temperature of from 80°C to 140°C, whereby the bringing the two components into a state where the two components are mutually compatible in the absence of a solvent (column 6, lines 1-4); and **(15)** wherein the resin composition further comprises an inorganic filler (column 6, lines 54 through column 7, line 6).

Sagara et al. do not explicitly disclose that the reaction step takes place in the presence of a solvent or that the organophosphorous compound is added (compounded) after reacting the epoxy resin and amine-type curing agent. However, this variation between the prior art and the instant invention represents a "change in sequence of adding ingredients". It has been found that the selection of any order of mixing ingredients is *prima facie* obvious – *In re Gibson*, 39 F.2d

Art Unit: 1712

975, 5 USPQ 230 (CCPA 1930). Hence, the method set forth in claims 14-15 is *prima facie* obvious over the prior art.

Sagara et al. do not provide a structural diagram for their organophosphorous compound; rather, it is described in terms of its starting materials: 1) an organic phosphorous compound selected from 3,4,5,6-dibenzo-1,2-oxaphosphane-2-oxide and diphenylphosphineoxide (column 4, lines 4-11); and 2) a quinone compound selected from 1,4-benzoquinone, 1,2-benzoquinone or 1,4-naphthoquinone (column 3, line 66 through column 4, line 3). Wang et al. (US Pat. No. 6,291,626) show the reaction of: 1) DOPO (9,10-dihydro-9-oxa-10-phosphaphenanthrene-10-oxide), which is an alternate way of expressing the compound 3,4,5,6-dibenzo-1,2-oxaphosphane-2-oxide; and 2) 1,4-benzoquinone or 1,4-naphthoquinone (top of columns 7 and 8). The resulting product satisfies the structure set forth in the instant invention; hence, the reaction product of Sagara et al. would have inherently satisfied the structure set forth in the instant invention.

As with the previous claims, the term *compounded* has been interpreted in a broad sense to mean, "to put together (parts) so as to form a whole" – *Merriam-Webster's Collegiate Dictionary, Tenth Edition*. Also, the compounding temperature has been assumed to be room temperature, which would inherently fall within the claimed range. Therefore, the prior art would have inherently satisfied the conditions of a compounding step.

Therefore, if not explicitly taught by the reference, then the teachings would have been obvious to one of ordinary skill in the art at the time of the invention.

Art Unit: 1712

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ito et al. (US Pat. No. 6,180,695) is closely related to the prior art; however, the reference fails to read on the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J Feely whose telephone number is 703-305-0268. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Dawson can be reached on 703-308-2340. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Michael J. Feely
April 23, 2003



EXAMINER
MICHAEL J. FEELY
APR 23 2003